1				**Background Statistics for Data Sets with Non-Detects**								
2		**User Selected Options**										
3		Date/Time of Computation		7/30/2013 12:32:44 PM								
4		From File		WorkSheet.xls								
5		Full Precision		OFF								
6		Confidence Coefficient		95%								
7		Coverage		95%								
8		rent or Future K Observations		1								
9		mber of Bootstrap Operations		2000								
10												
11	**DDx**											
12												
13						**General Statistics**							
14				Total Number of Observations		65			Number of Missing Observations			0
15				Number of Distinct Observations		59						
16				Number of Detects		45			Number of Non-Detects			20
17				Number of Distinct Detects		45			Number of Distinct Non-Detects			14
18				Minimum Detect		0.2			Minimum Non-Detect			0.18
19				Maximum Detect		3.41			Maximum Non-Detect			1.8
20				Variance Detected		0.7			Percent Non-Detects			30.77%
21				Mean Detected		1.852			SD Detected			0.837
22				Mean of Detected Logged Data		0.46			SD of Detected Logged Data			0.654
23												
24						**Critical Values for Background Threshold Values (BTVs)**							
25				Tolerance Factor K (For UTL)		2			d2max (for USL)			3.057
26												
27						**Normal GOF Test on Detects Only**							
28				Shapiro Wilk Test Statistic		0.956			**Shapiro Wilk GOF Test**			
29				5% Shapiro Wilk Critical Value		0.945			Detected Data appear Normal at 5% Significance Level			
30				Lilliefors Test Statistic		0.106			**Lilliefors GOF Test**			
31				5% Lilliefors Critical Value		0.132			Detected Data appear Normal at 5% Significance Level			
32						**Detected Data appear Normal at 5% Significance Level**							
33												
34						**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
35				Mean		1.431			SD			0.949
36				95% UTL95% Coverage		3.329			95% KM UPL (t)			3.027
37				90% KM Percentile (z)		2.647			95% KM Percentile (z)			2.992
38				99% KM Percentile (z)		3.638			95% KM USL			4.331
39												
40						**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
41				Mean		1.434			SD			0.942
42				95% UTL95% Coverage		3.318			95% UPL (t)			3.018
43				90% Percentile (z)		2.641			95% Percentile (z)			2.984
44				99% Percentile (z)		3.625			95% USL			4.313
45						**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**							
46												
47						**Gamma GOF Tests on Detected Observations Only**							
48				A-D Test Statistic		1.403			**Anderson-Darling GOF Test**			
49				5% A-D Critical Value		0.755			Data Not Gamma Distributed at 5% Significance Level			
50				K-S Test Statistic		0.168			**Kolmogrov-Smirnoff GOF**			
51				5% K-S Critical Value		0.133			Data Not Gamma Distributed at 5% Significance Level			
52						**Data Not Gamma Distributed at 5% Significance Level**							
53												
54						**Gamma Statistics on Detected Data Only**							
55				k hat (MLE)		3.351			k star (bias corrected MLE)			3.143
56				Theta hat (MLE)		0.553			Theta star (bias corrected MLE)			0.589
57				nu hat (MLE)		301.6			nu star (bias corrected)			282.9
58				MLE Mean (bias corrected)		1.852						
59				MLE Sd (bias corrected)		1.045			95% Percentile of Chisquare (2k)			13.02
60												
61						**Gamma ROS Statistics using Imputed Non-Detects**							
62						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							

63	GROS may not be used when kstar of detected data is small such as < 0.1											
64	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
65	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
66					Minimum	0.2				Mean		1.511
67					Maximum	3.41				Median		1.164
68					SD	0.871				CV		0.577
69					k hat (MLE)	2.674				k star (bias corrected MLE)		2.561
70					Theta hat (MLE)	0.565				Theta star (bias corrected MLE)		0.59
71					nu hat (MLE)	347.6				nu star (bias corrected)		332.9
72					MLE Mean (bias corrected)	1.511				MLE Sd (bias corrected)		0.944
73					95% Percentile of Chisquare (2k)	11.26				90% Percentile		2.775
74					95% Percentile	3.32				99% Percentile		4.512
75	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
76	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
77					WH	HW					WH	HW
78				Approx. Gamma UTL with 95% Coverage	3.88	4.042				95% Approx. Gamma UPL	3.351	3.446
79				95% Gamma USL	6.031	6.584						
80												
81	**The following statistics are computed using gamma distribution and KM estimates**											
82	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
83					k hat (KM)	2.278				nu hat (KM)		296.1
84					WH	HW					WH	HW
85				Approx. Gamma UTL with 95% Coverage	4.328	4.621				95% Approx. Gamma UPL	3.641	3.813
86				95% Gamma USL	7.22	8.245						
87												
88	**Lognormal GOF Test on Detected Observations Only**											
89					Shapiro Wilk Test Statistic	0.846				**Shapiro Wilk GOF Test**		
90					5% Shapiro Wilk Critical Value	0.945				Data Not Lognormal at 5% Significance Level		
91					Lilliefors Test Statistic	0.182				**Lilliefors GOF Test**		
92					5% Lilliefors Critical Value	0.132				Data Not Lognormal at 5% Significance Level		
93	**Data Not Lognormal at 5% Significance Level**											
94												
95	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
96					Mean in Original Scale	1.465				Mean in Log Scale		0.149
97					SD in Original Scale	0.911				SD in Log Scale		0.733
98					95% UTL95% Coverage	5.026				95% BCA UTL95% Coverage		3.029
99					95% Bootstrap (%) UTL95% Coverage	3.043				95% UPL (t)		3.98
100					90% Percentile (z)	2.969				95% Percentile (z)		3.874
101					99% Percentile (z)	6.383				95% USL		10.9
102												
103	**Background DL/2 Statistics Assuming Lognormal Distribution**											
104					Mean in Original Scale	1.434				Mean in Log Scale		0.0811
105					SD in Original Scale	0.942				SD in Log Scale		0.823
106					95% UTL95% Coverage	5.622				95% UPL (t)		4.327
107					90% Percentile (z)	3.113				95% Percentile (z)		4.197
108					99% Percentile (z)	7.353				95% USL		13.41
109	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
110												
111	**Nonparametric Distribution Free Background Statistics**											
112	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
113												
114	**Nonparametric Uppper Limits for BTVs(no distinction made between detects and nondetects)**											
115					Order of Statistic, r	64				95% UTL with95% Coverage		3.043
116					Approximate f	1.684				Confidence Coefficient (CC) achieved by UTL		0.842
117					95% UPL	2.961				95% USL		3.41
118					95% KM Chebyshev UPL	5.598						
119												
120	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
121	data set free of outliers and consists of observations collected from clean unimpacted locations.											
122	The use of USL tends to provide a balance between false positives and false negatives provided the data											
123	represents a background data set and when many onsite observations need to be compared with the BTV.											
124												